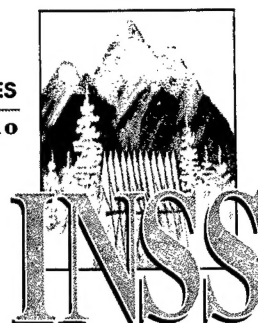


---

**INSTITUTE FOR NATIONAL SECURITY STUDIES**  
**U.S. Air Force Academy, Colorado**



**Environmental Security in the Czech  
Republic: Status and Concerns  
in the Post Communist Era**

Paul J. Valley

October 1998

---

**INSS OCCASIONAL PAPER 22**  
Environmental Security Series

**DISTRIBUTION STATEMENT A**  
Approved for Public Release  
Distribution Unlimited

Form Approved  
OMB No. 0704-0188

1. REPORT DATE (DD-MM-YYYY)  
01-10-1998

3. DATES COVERED (From - To)

5a. CONTRACT NUMBER	
---------------------	--

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

5d. PROJECT NUMBER	
--------------------	--

5e. TASK NUMBER	
-----------------	--

5f. WORK UNIT NUMBER

8. PERFORMING ORGANIZATION REPORT NUMBER	
--	--

USAF INSS

2354 Fairchild Dr., Ste 5L27

USAF Academy, CO 80840

10. SPONSOR/MONITOR'S ACRONYM(S)	
----------------------------------	--

HQ USAF/XONP

USAF INSS

1480 AF Pentagon, Room 5D518

2354 Fairchild Dr., Ste 5L27

Washington, DC 20330-1480

USAF Academy, CO 80840

## 11. SPONSOR/MONITOR'S REPORT

NUMBER(S)

A Approved for public release; distribution is unlimited.

## 14. ABSTRACT

The Czech Republic has made great strides toward reconciling its political and economic development with environmental protection and security issues since its recent democratization. Although new technological and legislative efforts continue to work at reducing emissions from automobiles, industries, power plants and coal mining, the Republic is committed to continuing its battle against air and water pollution, poor waste management, and needless destruction of nature.

Shifting the structure of primary energy sources to qualitatively better fuels, along with the introduction of less energy-consuming technologies and the activation of new nuclear reactors, would eventually replace most of the output of coal burning power plants. However, the use of nuclear power has been opposed by several political and environmental activists groups. At the international level, Austria's opposition to the Temelin Nuclear Power plant is of great concern since Austria, as a non-nuclear state, propagates negative information about nuclear power to its citizens and other countries.

Environmental Security, Czech Republic, Nuclear Power, Environmental Legislation, USAFA

## 17. LIMITATION OF ABSTRACT

18. NUMBER OF PAGES

19a. NAME OF RESPONSIBLE PERSON  
DR. JAMES M. SMITH

**a. REPORT**  
**UNCLASSIFIED**

**b. ABSTRACT**  
**UNCLASSIFIED**

**c. THIS PAGE  
UNCLASSIFIED**

UNCLASSIFIED  
UNLIMITED

42

**19b. TELEPHONE NUMBER** (include area code)  
719-333-2717

**Environmental Security in the Czech  
Republic: Status and Concerns in the  
Post-Communist Era**

**Paul J. Valley**

INSS Occasional Paper 22

*Environmental Security Series*

October 1998

USAF Institute for National Security Studies  
USAF Academy, Colorado

19990708 032

---

The views expressed in this paper are those of the authors and do not necessarily reflect the official policy or position of the Department of the Air Force, the Department of Defense, or the U.S. Government. This paper is approved for public release by SAF/PAS; distribution is unlimited.

\*\*\*\*\*

#### *ABOUT THE AUTHOR:*

*Capt Paul J. Valley currently serves as an assistant professor of biology at the United States Air Force Academy, specializing in ecology and environmental security issues. He earned his BA from Colorado College in 1986 and his MS from Creighton University in 1995. Until his tenure at the Air Force Academy, Capt Valley served as an intelligence officer from 1988 to 1994. He worked in the areas of imagery analysis and training, collection management at both the tactical and strategic levels, systems integration and management, and as an executive officer to the United States Strategic Command's Director of Intelligence.*

Comments pertaining to this paper are invited; please forward to:

Director, USAF Institute for National Security Studies  
HQ USAFA/DFES  
2354 Fairchild Drive, Suite 5L27  
USAF Academy, CO 80840  
phone: 719-333-2717  
fax: 719-333-2716  
email: smithjm.dfe@usafa.af.mil

*Visit the Institute for National Security Studies home page at  
<http://www.usafa.af.mil/inss>*



## TABLE OF CONTENTS

Foreword	vii
Executive Summary	ix
Acknowledgements	xii
Map: Czech Republic	xiv
Introduction	1
Scope of this Study	1
Czechoslovakia: 1940s through the 1980s	2
The Velvet Revolution and Velvet Divorce	4
State of the Environment	7
Air Pollution	7
Water Pollution	10
Waste Management	12
Nature Protection	14
Environmental Risk Assessment and Monitoring	15
Role of the Ministry of the Environment	15
Project Silesia	17
Private Reclamation Efforts	20
KAP Corporation	20
RVM Joint Stock Company	21
The Future	23
Future Energy Sources	23
Potential for Internal Conflict	27
Potential for International Conflict	28
Conclusions and Recommendations	31
Endnotes	35
Sources Consulted	40





## FOREWORD

We are pleased to publish this twenty-second volume in the *Occasional Paper* series of the US Air Force Institute for National Security Studies (INSS). We offer it to our readers as a well-crafted first-stage environmental country study. Captain Valley details the political and economic issues, players, policies, and consequences of Cold War environmental degradation and post-Cold War environmental recovery efforts. He also fully addresses the external political, economic, and security implications on relations between the Czech Republic and key neighbors. Environmental factors are increasingly important in national security terms, and this study stands as a fine example of how one can address those factors in security terms. The next step would be to add implications for defense spending and on the operation of Czech military installations, the conduct of training and exercises, etc. Further, a second-stage study would add focus to the environmental factors that will influence the Czech Republic membership and participation in NATO. But those factors are for the next stage. For now, we offer Captain Valley's excellent first-stage environmental country study.

### *About the Institute*

INSS is primarily sponsored by the National Security Policy Division, Nuclear and Counterproliferation Directorate, Headquarters US Air Force (HQ USAF/XONP) and the Dean of the Faculty, USAF Academy. Our other sponsors currently include the Air Staff's Intelligence, Surveillance, and Reconnaissance Directorate (XOI); the Secretary of Defense's Office of Net Assessment (OSD/NA); the Defense Threat Reduction Agency (incorporating the sponsorship of the

---

Defense Special Weapons Agency and the On-Site Inspection Agency; the Army Environmental Policy Institute; the Plans Directorate of the United States Space Command; and the Air Force long-range plans directorate (XPXP). The mission of the Institute is "to promote national security research for the Department of Defense within the military academic community, and to support the Air Force national security education program." Its research focuses on the areas of greatest interest to our organizational sponsors: arms control, proliferation, national security, regional studies, Air Force policy, the revolution in military affairs, information warfare, environmental security, and space policy.

INSS coordinates and focuses outside thinking in various disciplines and across the military services to develop new ideas for defense policy making. To that end, the Institute develops topics, selects researchers from within the military academic community, and administers sponsored research. It also hosts conferences and workshops and facilitates the dissemination of information to a wide range of private and government organizations. INSS is in its sixth year of providing valuable, cost-effective research to meet the needs of our sponsors. We appreciate your continued interest in INSS and our research products.

JAMES M. SMITH

Director

nature protection. Overall, relationships with Poland and Germany appear solid; and although political, ideological, and economic differences exist with Slovakia, Czech-Slovak diplomatic ties remain stable.

Also at the international level, Austria's opposition to nuclear power and the construction of the Temelin Nuclear Power Plant is of greater concern. Since Austria is a non-nuclear state and propagates negative information about nuclear power to its citizens and other countries, one can see the reason for concern. To this point, there have been no political or military threats, or violent confrontations, but concerns are rising as the operational date of the new Temelin reactor site approaches (projected for July 1999).

The Republic's infrastructure appears to be intact and is successfully supporting the environmental issues facing it today. The country's environmental developments and efforts to pass new environmental legislation were impressive; however, due to the Republic's current political and economic instability and uncertain forecast, continued foreign support and investment will undoubtedly be necessary for the Republic to reach the level of environmental security and safety of other westernized countries. The supportive relationships between neighboring countries, government agencies, private reclamation companies, and industries were also impressive. Although concern involving internal or international conflict is not great at this time, certain issues, especially transboundary pollution problems and the nuclear power debate, warrant continued monitoring.

---

## ACKNOWLEDGMENTS

I would like to thank the following individuals for their administrative, logistic, and editorial support (*in alphabetical order*).

- Chris Bell, Policy Analyst, Office of the Secretary of Defense, Environmental Security/International Activities, Washington, D.C.
- Marja Hynkova, Assistant to the Environment, Science, and Technology (EST) Officer, United States Embassy, Prague, Czech Republic
- Douglas McNeal, EST Officer, United States Embassy, Prague, Czech Republic
- Robert K. Noyd, Associate Professor of Biology, United States Air Force Academy
- John L. Putnam, Assistant Professor of Biology, United States Air Force Academy
- Marybeth Ulrich, Associate Professor of Political Science, United States Air Force Academy
- Michael Voyles, USAR, Language Interpreter, Det 1, Co A, 377th MIBn

I would also like to thank the Army Environmental Policy Institute (AEPI) for its sponsorship and financial support of this project.

nature protection. Overall, relationships with Poland and Germany appear solid; and although political, ideological, and economic differences exist with Slovakia, Czech-Slovak diplomatic ties remain stable.

Also at the international level, Austria's opposition to nuclear power and the construction of the Temelin Nuclear Power Plant is of greater concern. Since Austria is a non-nuclear state and propagates negative information about nuclear power to its citizens and other countries, one can see the reason for concern. To this point, there have been no political or military threats, or violent confrontations, but concerns are rising as the operational date of the new Temelin reactor site approaches (projected for July 1999).

The Republic's infrastructure appears to be intact and is successfully supporting the environmental issues facing it today. The country's environmental developments and efforts to pass new environmental legislation were impressive; however, due to the Republic's current political and economic instability and uncertain forecast, continued foreign support and investment will undoubtedly be necessary for the Republic to reach the level of environmental security and safety of other westernized countries. The supportive relationships between neighboring countries, government agencies, private reclamation companies, and industries were also impressive. Although concern involving internal or international conflict is not great at this time, certain issues, especially transboundary pollution problems and the nuclear power debate, warrant continued monitoring.

---

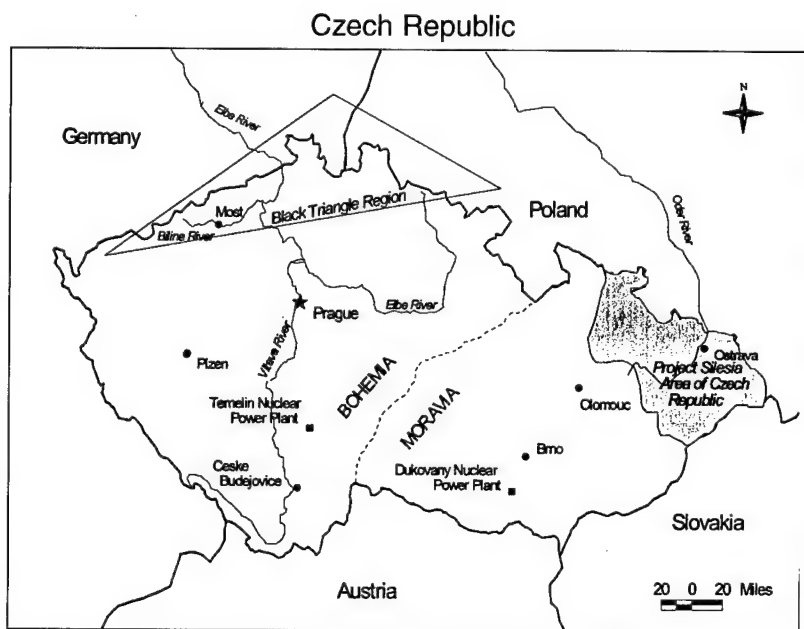
## ACKNOWLEDGMENTS

I would like to thank the following individuals for their administrative, logistic, and editorial support (*in alphabetical order*).

- Chris Bell, Policy Analyst, Office of the Secretary of Defense, Environmental Security/International Activities, Washington, D.C.
- Marja Hynkova, Assistant to the Environment, Science, and Technology (EST) Officer, United States Embassy, Prague, Czech Republic
- Douglas McNeal, EST Officer, United States Embassy, Prague, Czech Republic
- Robert K. Noyd, Associate Professor of Biology, United States Air Force Academy
- John L. Putnam, Assistant Professor of Biology, United States Air Force Academy
- Marybeth Ulrich, Associate Professor of Political Science, United States Air Force Academy
- Michael Voyles, USAR, Language Interpreter, Det 1, Co A, 377th MIBn

I would also like to thank the Army Environmental Policy Institute (AEPI) for its sponsorship and financial support of this project.





Map by T. Schwartzlow



## ***Environmental Security in the Czech Republic: Status and Concerns in the Post-Communist Era***

### **INTRODUCTION**

#### **Scope of this Study**

This study examines the state of the environment in the Czech Republic and evaluates current and future initiatives, both in the government and private sectors, that aim at lessening environmental damage. Most of the data collection and interviews associated with this study were conducted from 12-18 June 1997 in the Czech Republic. Interviews were conducted with six representatives from the Republic's Ministry of the Environment in Prague and Ostrava, an ecologist from Palacky University in Olomouc, a nuclear chemist from the Czech Technical University in Prague, and two reclamation company executives in Prague and Most. The areas of air and water pollution, waste management, and the protection of natural resources are addressed, as well as efforts in environmental risk assessment and monitoring. The greatest emphasis, however, is placed on evaluating alternative energy sources and the potential for internal and international conflicts that could arise as a result of environmental events in the Republic. Is there a reason for concern? Does cooperation exist between neighboring countries? What are the current perceptions of officials within the Republic's Ministry of the Environment? What are the current perceptions of private sector corporations and scholars involved in environmental improvement initiatives? Before attempting to answer these questions and examine the issues, it is helpful to briefly examine recent historical events leading up to the present-day Czech Republic.

---

### **Czechoslovakia: 1940s through the 1980s**

Czechoslovakia was the only democracy in East Europe that had been carried over from the World War I-World War II interwar period. In the 1940s, however, communism was on the rise in Czechoslovakia, largely due to the fact that the Soviet Union was viewed by many Czechoslovakians as the power that liberated them from the Nazis.<sup>1</sup> The communists continued to grow in strength, and in 1948, the “Prague Coup” marked the complete communist takeover of Czechoslovakia.<sup>2</sup>

Throughout the 1950s and 1960s, major ideological and political discussions increasingly found their way into virtually all aspects of Czechoslovakian lives. The Communist Party (KSC) implemented a new constitution in 1960 and Czechoslovakia officially became the Czechoslovak Socialist Republic (CSSR). Recall, however, that the Czechoslovakian people experienced the democratic tradition between the twentieth century world wars, which gave them both a memory of and a confidence in the democratic way of life. As such, they became more and more dissatisfied with KSC philosophies throughout the 1960s, particularly in the economic sphere. It became obvious to many that the centralized, command economy was not meeting the needs of development in Czechoslovakia. Heeding the opinions of leading economists in Czechoslovakia, the general public became more convinced that the idea of linking the CSSR economic plan with a market economy was a good idea. Economic reform, therefore, was formally proposed, and under the pressure of economic necessity, the KSC relaxed its communist ideological barriers.<sup>3</sup>

Although communism in Czechoslovakia left its mark on the Czech people, the lack of popular acceptance of the communist political system made it easier to reject it when economic instability permitted the re-adoption of democratic values.<sup>4</sup> This “re-adoption” seemed to spur other cultural shifts in the 1960s and 1970s. The Sixties, particularly, saw the emergence of the golden age of Czech culture. Small-form

theaters, theaters of poetry and song, classical theaters, and cinematic art sprung up throughout Czechoslovakia.<sup>5</sup> Additionally, environmental movements, largely based on Western influence, became more prevalent in Czechoslovakia, particularly with students. Environmentalists were also becoming more active in politics, and were actually given some latitude during the communist era.<sup>6</sup> In general, a loosening of socialist norms was becoming more evident, and more importantly, was growing.

During the mid-1960s, Czechs and Slovaks pressed for massive reforms, ultimately wanting to come to terms with Czechoslovakia's economic and political problems, as well as attempting to transform relations between the Czechs and Slovaks.<sup>7</sup> This formal reform era, known as the Prague Spring, began in January 1968 and continued for eight months. It met with support from many members of the Czechoslovakian government, as well as members of the media, who touted Prague Spring as a period of public (not closed-door) policy, a "time of revival," and a period of exceptional dynamism.<sup>8</sup>

During this time as well, Soviet leader Leonid Ilyich Brezhnev began to perceive Czechoslovakian reforms as a threat to the integrity of the Soviet Empire, and finally decided on Soviet intervention and occupation of Czechoslovakia, which began on 21 August 1968.<sup>9</sup> During negotiations of 23-26 August 1968 the Soviets succeeded in forcing senior CSSR leaders to sign what became known as the Moscow Protocols, legalizing the presence of the Soviet military in Czechoslovakia. In exchange, the Czechoslovakian leaders hoped they would maintain some reform efforts, particularly in the economic arena.<sup>10</sup> Soviet influence in Czechoslovakia became even more prevalent, however, and the Soviets finally broke down the unity of the Czech and Slovak reform efforts.

Throughout the 1970s and 1980s, opposition to Soviet authoritarian influences and communist ideals in general grew dramatically among the Czech and Slovak peoples. Several reform

---

movements again began in earnest, and in 1977 a formal declaration, *Charter 77*, was drafted and signed by several members of a large reformist group. (Among the signatories of this group was the playwright, Vaclav Havel, the current President of the Czech Republic.) This charter demanded respect for human rights and boldly stated that socialism could not keep up with developments in advanced capitalist countries. The KSC, however, made no official changes to its Communist Party policies.<sup>11</sup>

These growing anti-communist sentiments grew in the mid-1980s with the introduction of Mikhail Gorbachev's *perestroika* and *glasnost* in the Soviet Union. These principles served to awaken Soviet citizens to the corrupt communist system and to the tremendous gap in the standard of living between the communist East and the democratic West.<sup>12</sup> This Soviet "awakening" made its way to Czechoslovakia, where it gained support, and anti-communist sentiments continued to grow. Written protests and demonstrations became commonplace throughout Czechoslovakia during the mid- to late 1980s. Finally, on 17 November 1989 the brutal break up of a student-led demonstration signaled the beginning of the end of Communist Party rule in Czechoslovakia.<sup>13</sup>

#### **The Velvet Revolution and Velvet Divorce**

The continued liberalization taking place in the Soviet Union and the Eastern bloc countries along with mass support for student-led demonstrations culminated in the November 1989 "Velvet Revolution." This "gentle" revolution swept through the country and resulted in a rapid, almost bloodless, change of power. Vaclav Havel, the current President of the Republic, was the acknowledged leader of this revolution. Leading up to its fruition, Havel spearheaded many enormous, peaceful demonstrations. The Czechs and Slovaks were finally successful in driving home the point that the overwhelming majority of the nation's people wanted change, and above all, the end of one-party communist rule.<sup>14</sup>

In the words of Dr. Pavel Novacek, an ecologist at Palacky University in Prague,

In 1989, our people overthrew the forty-year hegemony of one political party, and since then our society has started to change. The once tempting vision of the construction of a communist society died and we found ourselves at the “beginnings of capitalism” with all the consequent positive and negative phenomena....<sup>15</sup>

Dr. Novacek believes there were at least six groups that influenced changes in the system: students, signatories of *Charter 77*, Christians, artists, protectors of nature, and scientists (particularly ecologists, economists, sociologists, and futurologists). According to Dr. Novacek, ecologists and “protectors of nature” (synonymous to what Western countries typically call “environmentalists”) had an opportunity to greatly influence the development of society during and after the Velvet Revolution, but they missed that opportunity.<sup>16</sup>

Following the Velvet Revolution, the two main opposition groups to Communist Party rule—the Civic Forum (Czechs) and the Public Against Violence (Slovaks)—remained united through the country’s first democratic elections in 1990. But by the time Czechoslovakia held its second post-communist elections in 1992, their divergence of philosophies on economic reform became too great. The Czechs wanted a rapid transition to a market economy and privatization, while the Slovaks wanted a slower, less painful approach to these reforms. These differing philosophies, combined with a resurgence of Czech and Slovak nationalism, essentially paralyzed the federal government’s capacity to continue the democratic reform process.<sup>17</sup>

These political and ideological differences ultimately led to the relatively amicable dissolution of Czechoslovakia on 1 January 1993. This “Velvet Divorce,” as it came to be known, created two new states in Europe: the Czech Republic and Slovakia. The Czech Republic proceeded with its plan for a rapid transition to a market economy, while

---

Slovakia proceeded at a slower rate of economic transition that took into account the transformation of its large, outmoded heavy industrial sector and higher rate of unemployment. In the first several years following the fall of Communist Party rule, the economic progress achieved in the Czech Republic was heralded by many as miraculous.<sup>18</sup> The Republic's balanced budget, 9.1% annual inflation rate, and 3.4% unemployment rate indicated to many economists that the Republic would lead the pack of post-communist nations vying for entry into western European organizations.<sup>19</sup>

At the end of 1997, however, both inflation and unemployment rates increased to 11% and 7.5% respectively, and there was a slight deviation from a balanced budget.<sup>20</sup> To compound matters, Prime Minister Vaclav Klaus resigned in December 1997 over the discovery of a party slush fund. This focused worldwide attention on the apparent weaknesses of the Czech democratic transition, especially since Klaus was the economic architect during this transition period. Klaus' political fall and the recent sagging economic indicators have raised concerns over the country's stability.<sup>21</sup>

This instability is still evident today under the leadership of newly elected Prime Minister Milos Zeman from the leftist Czech Social Democratic Party (CSSD). The CSSD won the largest number of seats in the June 1998 elections, but the party has no clear mandate. The right-wing Civic Democratic Party (ODS), still under the leadership of a revitalized Vaclav Klaus, has reached a pact with the CSSD. This deal will enable the formation of a minority CSSD government, and the CSSD administration will rely on the tacit support of the ODS.<sup>22</sup> At this point in time, it is too early to determine the fate of the Republic's budget deficit, the speed of privatization in the country, and the inflation and unemployment rates under Zeman's leadership. This present instability is raising questions concerning the Republic's ability to enforce its new

environmental laws and maintain strong diplomatic ties with its neighboring countries, particularly in the environmental security arena.

### **State of the Environment**

#### **Air Pollution**

Since 1990, the Czech Republic has seen a consistent decline in the amount of principal gaseous pollutants in the air. These declines are continuing today and are expected to continue well into the next millennium due to technological advances and the passage of legislation levying heavy restrictions on industries in the Republic. Measurements taken in the Republic in 1995 indicated that emissions of principal gaseous pollutants (sulfur dioxide, nitrogen oxides, carbon monoxide, and hydrocarbons) decreased by 9.7% from 1994, and by 36% from 1990. Similarly, the amounts of suspended particulate matter in the air (primarily from industry) have declined as well. These solid substance emissions decreased by 41% from 1994, and by 68% from 1990.<sup>23</sup>

The Czech Republic is viewed by many as a leader among European countries belonging to the Organization of Economic Cooperation and Development (OECD) in terms of setting high environmental improvement standards. The Republic has been a member of the OECD since December 1995 and has taken the initiative on several environmental issues, particularly air pollution. The Republic signed the Clean Air Act of 1991, which meets or exceeds emission standards set by other European countries. The Republic also participates in virtually all major international European environmental symposia and conferences, again setting the standards for other central and eastern European countries.<sup>24</sup>

Despite the adoption of these new high standards and decreases observed in emission levels, air pollution problems still exist. For example, emissions of sulfur dioxide remain higher relative to the

---

average value in European OECD countries. In 1995, the Republic tallied sulfur dioxide emissions at three times that of the average of all European OECD countries.<sup>25</sup> Furthermore, although the Republic is seeing a decrease in nitrogen oxide emissions from industries, these decreases are being offset by increases in nitrogen oxide emissions from automobiles.<sup>26</sup>

In 1985, 15% of all emissions in the Republic came from privately owned vehicles. Today, that percentage stands at 35% and is expected to reach about 50% in the "near future."<sup>27</sup> Only 12% of automobiles operated in the Republic are equipped with catalytic converters. As such, the problems associated with nitrogen oxide and carbon monoxide emissions are especially prevalent, and quite serious, in the larger cities (e.g., Prague).<sup>28</sup> Additionally, the number of privately owned automobiles in the Republic, particularly in the larger cities, is increasing.<sup>29</sup> Currently, legislation is being drafted requiring all automobiles to have catalytic converters within 5-10 years.

According to several Ministry of the Environment officials, air pollution is the leading environmental problem in the Republic today. A difficult logistical problem facing the government is the enforcement of government emission standards and regulations for both private automobiles and industry. The Republic has formed a new organization, the Czech Inspection of the Environment Office, that is responsible for enforcing these regulations. It is still a fledgling organization, however, and is experiencing "growing pains."<sup>30</sup>

Although Czech air pollution standards appear to be in line with other European countries, the Ministry of the Environment is drafting a new, updated Clean Air Act.<sup>31</sup> The Ministry's Air Protection Department is looking to set even more stringent controls on industries and power plants, as well as controls on public transportation emissions. The Department is lobbying for "emission permits" and emissions testing for private automobiles, ultimately ensuring that automobile emission levels



in the Republic are at, or below, those of other European countries. While the passage of environmental legislation displays the country's desire to improve environmental conditions, more data on actual enforcement of standards and emission levels must be collected to fully determine the success or failure of this legislation.

The general public is concerned about the automobile emissions problem; however, their admission of the problem does not seem to coincide with their actions—buying automobiles.<sup>32</sup> Being a fledgling democracy, the public tends to latch onto those privileges not previously granted them under Communist Party rule, and owning a new western European automobile is an exciting adventure for many citizens. As mentioned, this increase in privately owned automobiles is a major element of the country's air pollution problem.

One of the largest industries in the Republic is the mining of raw materials—primarily coal, but also limestone, sand, gravel, clay, and building stones.<sup>33</sup> The processing of these materials, as well as the use of coal burning for industries, power plants, and private homes, is a major contributor to air pollution. Particular regions of the Republic are more affected than others based on higher levels of coal burning activity.

The northwest corner of the Republic is considered the most polluted area in the country. This region, which also encompasses the common borders of Germany and Poland, is known as the "Black Triangle" (see map on page XIV). (It should be noted the borders of the Black Triangle region are only loosely defined, and airborne pollutants are not concentrated only within the borders as shown on the map.) The Black Triangle is considered one of the most heavily polluted areas in the world in terms of airborne particulates; in fact, approximately 20% of all sulfur dioxide emissions in Europe can be traced to this region.<sup>34</sup> Despite decreasing emissions in these three countries over the past seven years, the problem persists.

---

Due to prevailing winds and the topography of the land, air pollution from the Czech Republic regularly reaches Germany and Poland. This concerns the governments of these countries, but they appear to recognize the efforts the Republic is making to limit airborne emissions and reduce the effects of industrial activity. Additionally, bilateral agreements have been reached, and delegates from these three countries meet at least annually to discuss the status of efforts to reduce pollutants in the Black Triangle region.<sup>35</sup>

#### **Water Pollution**

The most highly polluted river in the Republic, the Bilina River, is also located in the northwest corner, or Black Triangle region, of the country. The pollution in the Bilina River is attributed to the heavy industrial activity in this region, specifically industrial by-products being discharged into the Bilina. Additionally, the largest open coal mine in the country (5 km by 6 km and over 80 meters deep) is located in this area of the Republic. This mine's processing activities contribute to the pollution of the Bilina River. The Bilina, in turn, flows into the Elbe River, which subsequently flows into southeastern Germany. This is obviously a concern to Germany, but a bilateral agreement has been reached with the German government, and it recognizes the efforts of the Republic to clean up the Bilina River.<sup>36</sup> It should be pointed out, however, this is one individual's perspective in the Ministry of the Environment. Another Ministry official was not as positive, indicating tensions still exist "to some extent" between the Czech Republic and Germany concerning this issue.<sup>37</sup>

The amended Water Management Act of 1992 levies stringent restrictions on industries, and river clean-up efforts throughout the Republic, not only the Bilina River, are ongoing. Additionally, the Republic has joined several international commissions that address the growing concerns over water pollution in rivers passing through more than one country. Multilateral coordination with respect to the Elbe

River began in 1990 and a similar agreement concerning the Oder River was established in 1996.<sup>38</sup>

Water pollution research technologies in the Republic have improved over the past five years (with assistance from the United States and some western European countries). Presently, all industries in the Republic are required by law to operate waste treatment plants and, more importantly, to operate them in compliance with the minimum standards set by the Water Management Act of 1992. Law has required companies to have water treatment plants since 1973, but the CSSR government rarely, if ever, enforced these standards. Even as recently as 1990, the government made exceptions for many companies. Beginning in 1991, however, the government made every attempt to strictly enforce all water protection initiatives (exceptions were no longer legal). Finally, in 1992, with the passage of the amended Water Protection Act, these efforts to clean up the Republic's waterways became even more serious.<sup>39</sup>

Despite the passage of this legislation, several areas in the water protection arena need improvement. For instance, as of 1995, approximately one-third of the overall length of monitored water courses in the Republic remains in the category of "highly" or "very highly polluted" water (as determined by international commissions).<sup>40</sup> The Ministry of the Environment believes with further adherence to the 1992 amended Water Protection Act, strict government controls and monitoring, and continued membership in multilateral river commissions, Czech Republic rivers will become less polluted, and will ultimately reach acceptable international standards.

The groundwater supplies and soil are also contaminated at several locations throughout the Republic as a consequence of industrial activities and pollution caused by the former Soviet Army. This contamination is primarily caused by chemical, petrochemical, and electro-technical industries, as well as by metallurgy and uranium mining (with careless handling of petroleum products and hazardous wastes

---

associated with these activities).<sup>41</sup> Agricultural activities using fertilizers and pesticides also contribute to the country's groundwater pollution problem. These issues are being addressed by the Water Protection and Management Department.

Damage caused by the former Soviet Army represents a major environmental burden from the past. The Soviet Army occupied a total of 73 sites throughout the Republic, and they were careless with the disposal of oil products, the destruction of forests, and the storage and hiding of explosives. Exploratory studies indicated that major decontamination efforts were a necessity for 60 of these 73 sites.<sup>42</sup> Presently, five major former Soviet bases still "require a lot of work;" however, financing continues to be a stumbling block to these clean-up efforts.<sup>43</sup> Promises of Soviet financial assistance were broken, so monies from the Czech Ministry of the Environment and the Czech National Property Fund (the primary organization working Czech privatization efforts) have provided the greatest support for these decontamination efforts.<sup>44</sup>

### **Waste Management**

Waste management has undergone several major changes since the formation of the new Republic. Of major significance was the 1992 Waste Management Act that ultimately stopped uncontrolled landfills. It specifically prevented neighboring countries (particularly then West Germany) from importing their waste into the Republic. Prior to 1992, Germans would commonly pay Czech companies, as well as Czech citizens, to dump German trash in the Republic. This is no longer legal in the Republic or in other European OECD countries.<sup>45</sup>

Prior to 1990, there were approximately 10,000 uncontrolled landfill sites throughout the current Czech Republic. Of these 10,000 sites, only 300 are still in use today as controlled and protected landfill sites.<sup>46</sup> Operation of the other 9,700 unprotected landfills was terminated as of July 31, 1996 pursuant to Act No. 238/1991 S.B. of the Waste

Management Act. These former unprotected landfills are gradually being reclaimed, primarily by private reclamation companies. The 300 controlled sites are strictly regulated and monitored for compliance with legislative and technical standards compatible with European Union standards.<sup>47</sup>

The 1992 Basel Convention in Switzerland also sought to control European transboundary movements and disposal of hazardous wastes. This convention also provided the foundation upon which the Republic drafted the 1997 Waste Control Act. This legislation decreases the overall amount of waste in the Republic and increases the fraction of waste that is used as secondary raw materials (i.e., for recycling purposes). This legislation was signed into law in May 1997 and became living, binding legislation in June 1998.<sup>48</sup>

The processing of secondary raw materials has seen a resurgence in the Republic, following a decline during the period from 1988-1990. During that time, not as many secondary sources were needed, and economic underpinnings added to this decline. But since 1990, recycling efforts have increased, including recycling of paper, glass, various metals, and some plastics. Today, it is estimated about 60% of old recyclable paper and about 80% of glass are being recycled.<sup>49</sup>

New technological advancements concerning waste management have also been implemented in the Republic, particularly with the use of more efficient, cleaner incinerator stations. Incinerator stations have been operational in Czechoslovakia for many years, but since 1993, the new Republic has made use of new technological improvements that have cleaned up several of these sites. Eighty of 400 incinerator stations operational today are in compliance with the 1992 Clean Air Act. The other 320 must comply with the Clean Air Act by December 1998 or they will be forced to shut down.<sup>50</sup>

---

### **Nature Protection**

During the years of Communist Party rule in Czechoslovakia, the preservation or conservation of nature were concepts given little or no attention. Through irresponsible industrial activities and military actions, the Czechoslovakian landscape and wildlife populations suffered drastically. Thousands of acres of Czech forests were indiscriminately destroyed and several flora and fauna species came close to extinction.<sup>51</sup> Two primary events were responsible for increasing public awareness and the subsequent revitalization of the new Czech Republic landscape: the insurgence of several environmental activist groups (similar in structure and philosophies to those of the United States and western Europe) and the passage of environmental legislation. The former dramatically increased public awareness of the Czech environmental situation and the latter legally sought to improve conditions.

The Republic was not alone in its efforts to improve and properly manage the landscape and ecosystems. The poor condition of nature and the overall landscape in central and eastern Europe, in particular, led the European Union to prepare the *European Strategy for Biological and Landscape Diversity*, that was accepted in 1995. A list of tasks for the years 1996 to 2000 by countries (including the Czech Republic) at the European Economic Commission of the United Nations Conference for Europe was also adopted.<sup>52</sup> This indicates the problems associated with the decrease in biodiversity are not unique to the Czech Republic.

International bilateral agreements have been enacted, citing general cooperation on environmental protection issues. Agreements have been reached with Poland and Germany to exchange scientific (particularly ecological) information and to form transboundary protected areas. Slovakia, however, has not agreed to form an "international area" with the Czech Republic, despite the Republic's repeated requests. In

fact, Slovakia currently has no real "nature protection" program, and no cooperative efforts with the Republic are anticipated in the near future. Similarly, Austria and the Czech Republic have no bilateral agreements concerning nature protection issues.<sup>53</sup>

Internally, the Republic drafted legislation specifically addressing the concerns of its landscapes and ecosystems. In February 1992, the Czech National Council Act on the Protection of Nature and the Landscape was enacted. This legislation specifically addresses the problems concerning nature preservation, landscape protection, and the general protection of plants and animals. The specific purpose of this legislation is:

... to contribute toward the preservation and restoration of the natural balance (equilibrium) in the landscape, toward the protection of the diversity of all forms of life, natural values and beauty, and toward the economical management of natural resources.<sup>54</sup>

According to the Ministry of the Environment's Nature Protection Department (which is similar in function to our U.S. Fish and Wildlife and National Park Services), the Republic should see a gradual regeneration of its flora and fauna following the implementation of revitalization measures (as per the referenced 1992 Act) and the continuing decrease in pollution of air and water. Significant reductions in the number of endangered species, however, will not appear until after a longer period of time.<sup>55</sup>

### **Environmental Risk Assessment and Monitoring**

#### **Role of the Ministry of the Environment**

The Ministry of the Environment's Environmental Risks and Monitoring Department has enacted several pieces of legislation dealing with assessments of various environmental activities and the monitoring of these activities. The Management of Chemical Substances and

---

Preparations Act, for example, is considered to be an “umbrella” act, under which several technical regulations can be enacted and enforced. This legislation is being drafted with assistance from the Ministries of Health and the Interior, and is expected to be enacted in the year 1999 or 2000. It will consist of approximately 80 specific directives impacting several industries, particularly the chemical industry. Most corporations are supportive of the provisions outlined in this legislation, and they are cooperating with respect to its research and drafting. The government has purposefully sought many corporations’ inputs to the legislation, and has received several positive criticisms and suggestions. The primary concern of the industries is the financial cost they will incur from the requirements set forth in the legislation.<sup>56</sup>

Another major piece of legislation, the Prevention of Industrial Accidents Act, was enacted in January 1997. This legislation, prepared by the Ministries of the Environment and the Interior, provides protection against radiation accidents. It specifically monitors industrial radioactivity, as well as radon levels in housing areas throughout the Republic. This was a relatively simple piece of legislation to prepare and defend, but it has become costly and cumbersome to implement. Its implementation is being accomplished with some success, but not without financial and logistical problems.<sup>57</sup> The Prevention of Industrial Accidents Act was also drafted in coordination with the governments of Switzerland, Germany, and the United Kingdom. Since nothing like this has ever been done in Czechoslovakia or the new Republic, it was extremely valuable to receive developmental information from these countries who have traditionally been successful at conducting similar monitoring activities.

The negative impacts of power plants, industry, and agriculture on the environment should gradually decrease as a result of compliance with the many new legislative requirements. These impacts will also decrease as a result of the introduction of modern, cleaner technologies



and an increasing interest in voluntary activities. Like the United States and other western European countries, citizens and industries in the Czech Republic are becoming more and more concerned with environmental problems and measures used to prevent these problems in the future.<sup>58</sup>

### **Project Silesia**

Project Silesia arguably has been the most extensive and successful environmental monitoring project in central and eastern Europe. It was an international pilot project initiated following a comprehensive study on the state of the environment in the Czech Republic. The initial study was conducted by a group of prominent economic and environmental experts in March 1991, with participation of the Czech, Slovak, Polish, and United States governments. Initially, Slovakia was to be a major player in this project, but due to topographical and ideological differences, they chose to decline membership in the project. The project then became solely a joint Czech Republic/Poland initiative, with United States assistance.<sup>59</sup>

Poland was very interested in this project due to the consequences of long-term neglect of air and water pollution control in Upper Silesia (southwestern Poland). Upper Silesia has been recognized as the second most polluted area in the world; the first being the northwest corner of the Czech Republic.<sup>60</sup> Because of the severity of pollution problems in the northeastern region of the Czech Republic as well, primarily due to heavy metal and coke production and pulp mill operations, the Republic also had much at stake and quickly embraced the project.

Project Silesia focused on six districts in the Republic, ultimately affecting 1.3 million people (see map on page XIV). These districts include Ostrava, Karvina, Opava, Frydek-Mistek, Novy Jicin, and Bruntal.<sup>61</sup> The project's primary objectives were spelled out in its charter:<sup>62</sup>

- Understand environmental risks in the territory of Project Silesia's interest, identify sources of these risks, and specify their relevance.
- Work out recommendations, projects, and specific interventions that would reduce environmental risks and would stop further deterioration of the environment.
- Transfer the best technical, technological, and methodical procedures that are economically effective and ecologically beneficial for environmental protection.
- Open chances for foreign capital to enter (and also stimulate domestic capital toward) the process of ecologically favorable restructuralization and reconstruction of the economy of the region.
- Create conditions suitable for realization of principles of sustainable development of the region that would incorporate economic, ecological, and social objectives.

Project Silesia was funded primarily by the United States, specifically by the U.S. Environmental Protection Agency (EPA). Funding also came from the Czech Ministries of the Environment and Health.<sup>63</sup>

Project Silesia consisted of two phases. The first phase began in June 1991 and specified the most significant health risks for the population caused by environmental problems, assessed the state of some of the more fragile ecosystems in the region, set priorities for solving the identified problems, and finally, prepared objectives for the second phase of the project. In phase one, an in-depth risk assessment of the region's environmental condition evaluated the risks resulting from<sup>64</sup>:

- air pollution (caused by coke oven plants, metallurgical and steel industries, fossil fuel combustion, and transportation);
- other specific pollution sources caused by industries and power plants;
- contaminated groundwater and drinking water;
- polluted surface waters;
- waste disposals.

The risks to human health are of major concern, particularly when dealing with the causes of air pollution. Various cancers, allergies, and

respiratory tract diseases are major health concerns that continue to be evaluated and monitored.

The second phase of the Project began in 1993 after discussions of the first phase's activities. After the analysis of risk assessments, identifying the major environmental problems and prioritizing these problems, Project Silesia members set out to provide solutions to the highest priority problems. These solutions aimed to reduce the most significant environmental risks<sup>65</sup>:

- air quality management;
- reduction of risks caused by coke oven plant emissions;
- reduction of risks from contamination of abandoned industrial sites;
- reduction of risks resulting from surface water pollution;
- reduction of risks from food contamination.

The response upon the completion of both phases of Project Silesia from industry was one of "anger."<sup>66</sup> Many industries, especially those considered to be the major contributors to the Republic's pollution problems, saw the EPA and Project Silesia as trouble-makers. Only after several meetings between the EPA, members of Project Silesia's governing body, and members of industry, did industries finally become convinced they would play a major role in critical decision-making processes. Additionally, the Czech government offered industry several investment options as restitution for constructive support of Project Silesia.<sup>67</sup>

Since Project Silesia was a pilot project primarily intended to spur eastern Europe's environmental clean-up efforts, United States financial assistance has since stopped, and Project Silesia was formally terminated September 30, 1997. The Republic plans to continue the work Project Silesia began with local funds, probably from the Ministry of the Environment and other government sources, as well as with technical and educational support from the EPA.<sup>68</sup>

Project Silesia sought to thoroughly evaluate and monitor the major environmental problems in the Silesia region. It was successful in

---

doing so, but still left many obstacles to overcome. For example, the enforcement of environmental regulations is cumbersome and financially strapping. It can be difficult to monitor air pollution emissions from a technical and logistical standpoint, and it is difficult to monitor all industrial outputs due to government manpower and financial limitations. Project Silesia laid the groundwork for further environmental risk assessment and monitoring activities, and government and private corporation infrastructures appear to be intact and in-place to implement the tasks that lie ahead.

#### **Private Reclamation Efforts**

Prior to 1990, industries and mining companies placed little emphasis on environmental consciousness and responsibility. This was due, in large part, to a government that did not require or enforce environmental standards. But following the formation of the new democracy and its subsequent adoption of environmental policies, as well as increased awareness in the general public about environmental issues, reclamation efforts became widespread and well-accepted.

#### ***KAP Corporation***

Before 1990, the Consultation, Remediation, and Investigation (KAP) Corporation was state-owned. Following swift privatization efforts in the new Republic, the new KAP Corporation was formally established late in 1990. KAP is involved in a myriad of environmental projects that include environmental clean-up efforts, site investigations, site remediation, risk assessments, environmental audits, geological studies, waste management planning, air protection, environmental impact studies, ecological studies, and use of the Geographical Information System (GIS) to assist in clean-up and assessment efforts. KAP employs over 300 economic and environmental specialists (growing from 18 in 1991 and 82 in 1994) and is involved in 2000 projects in the Republic and its neighboring countries.<sup>69</sup>

The success of KAP can be attributed to swift and well-managed initial economic transformation in the new Republic, as well as KAP's effectiveness in the management arena. KAP works closely with the Czech Republic National Property Fund and the Ministry of the Environment, and it receives informational support from local universities and the EPA. KAP claims to be the largest private reclamation company in the Republic, with a market share of about 20%.<sup>70</sup>

Some of KAP's major projects involve air and water pollution issues in the Black Triangle region particularly, but also in other areas of the country. KAP works closely with the Ministry of the Environment and the governments and private reclamation corporations of Poland and Germany concerning Black Triangle regional issues. Emissions from coal mining, power plant operations, pulp mill operations, chemical industries, and other industries throughout the Republic are also being addressed at the international level. KAP is also involved in several projects working to solve river pollution problems, particularly with the Oder, Elbe, Bilina, and Vltava Rivers. Several leading scientists and Ministry officials stated that KAP's involvement is critical to solving the several environmental problems in the Republic.

#### ***RVM Joint Stock Company***

Like the KAP Corporation, the Restoration, Management, and Technology (RVM) Joint Stock Company is involved in environmental assessment and reclamation efforts; however, where KAP is deeply involved in a wide range of projects, RVM concentrates primarily on restoration or "reclamation" projects. These reclamation projects aim to restore the environment in places where industries and mining companies have deeply scarred or damaged the land, ultimately returning the land to a more aesthetic condition or creating new agricultural or recreational areas. RVM was formally established in 1991 and, like KAP, was

---

converted from a state-owned organization to a privately owned company.<sup>71</sup>

The thrust of RVM's work is in the Republic's Black Triangle region and involves reclamation of sites primarily scarred by coal mining companies. After visiting many coal mining sites in and around the town of Most, it was evident the reclamation work of RVM, as well as that of other smaller reclamation companies, was professionally implemented and ecologically sound. (There are about 25 reclamation companies in the Republic today.) RVM restored many abandoned industrial sites and coal mining sites and is repairing ecological scars and damage to the environment caused by mining and industrial companies still operating.

The Czechs have been mining coal since the year 1403, and coal burning continues to be the most traditional and common form of power and heat used in the country. A shift to alternative energy sources may take place in the near future; however, coal will continue to be a fuel source in the Republic. Coal mining companies operating today are legally bound to finance the reclamation of lands destroyed by their activities.<sup>72</sup>

Typically, a productive coal mining company will move its mining efforts about 100 meters per year, bringing with it heavy machinery and the subsequent destruction of all vegetation and wildlife in its path. Reclamation efforts, then, aim to restore degraded land by planting various grasses, perennial herbs, shrubs, and trees. In some instances where it is physically and economically feasible, RVM will create reservoirs or lakes versus strictly planting vegetation. Two reclaimed reservoir sites visited were well-constructed with several forms of healthy native vegetation planted around the body of water. These sites, each only two years old, were still quite oligotrophic, but measurements of productivity levels in the reservoirs have been steadily increasing since their creation, and are anticipated to support many more forms of vegetation and wildlife in the future. Stocking of various game

fish and prey species has already begun in several reclaimed reservoir sites. Additionally, reclamation companies are required by law to monitor the status of their reclaimed sites for several years after their initial development.<sup>73</sup>

RVM, as well as all other reclamation companies, works closely with several departments within the Ministry of the Environment. Companies must be granted approval from the Ministry to work specific projects, and members of the Ministry assist in the planning process. During the planning processes, European Union delegates and Poland and Hungary Assistance for Restructuring of their Economies (PHARE) delegates also participate in the planning efforts. Reclamation efforts in all central and eastern European countries are well-supported by their governments and the general public, and are well-planned and professionally implemented.<sup>74</sup>

## **The Future**

### **Future Energy Sources**

Opinions about the future of the Republic's energy requirements and potential sources are many and varied. One overriding theme, however, seems to exist among the experts. Most believe coal, at least to some extent, will continue for some time as a source of energy in the Republic. Disagreements exist, however, on how prevalent coal burning will be in the coming years. Also, the reclamation company executives, scholars, and Ministry officials interviewed believe that natural gas will become a major energy source in the coming years. Natural gas is used today, but only to a relatively small extent. Finally, most experts think nuclear power will be an energy source of the future; however, its safety and efficiency are questioned by many.

The reclamation company executives interviewed are strong proponents of natural gas and nuclear energy. They believe there will

---

always be coal burning in the Republic, but it will be significantly reduced in the next 5-10 years. They also stated that coal burning is necessary today, and will remain a viable energy source for many years; however, natural gas and nuclear energy will be the most efficient, economic, and environmentally sound sources of energy in the future for the Republic.

By the year 2030, the Brown Coal Basin in the northwestern portion of the Republic should yield approximately 25 million tons of coal (versus 35 million tons today and 72 million tons in 1984). It is estimated that when coal mining began back in the 15th century, there were probably 6 billion tons available in the earth below Czech lands; today there are approximately 3 billion tons remaining that could be mined.<sup>75</sup> Additionally, it will be more efficient to burn brown coal (lignite) than black (hard) coal, since brown coal is easier to mine and process. Brown coal, however, also produces more potentially hazardous by-products, so technological R&D efforts to reduce sulfur dioxide and nitrogen oxide emissions will be necessary to comply with the new air pollution legislation.<sup>76</sup>

It appears natural gas will indeed be a major energy source in the coming years. The Czechs are already laying pipelines to transport the gas, primarily from Norway, Denmark, and Russia. In fact, the Republic already receives some natural gas from Russia. Additionally, the Czech government is offering 15,000 Czech crowns (about \$500.00 U.S.) to households that switch from coal burning to natural gas heating in their homes. The government is also taxing natural gas at a lower rate than coal.<sup>77</sup>

Dr. Novacek from Palacky University agrees that natural gas will become a major energy source for the Republic, but he also sees renewable energy sources (e.g., water, wind, geothermal) as the way of the future. See Table 1 for current primary energy source comparisons between the Republic and its neighbors.



**Table 1: Comparison of Energy Use by the Czech Republic and its Neighboring Countries<sup>78</sup>**

Energy Source	Country				
	Czech Republic	Germany	Poland	Slovakia	Austria
Coal	64.0%	27.0%	95.0%	36.0%	16.0%
Petroleum Products	14.0	43.0	1.0	18.0	42.0
Natural Gas	12.5	18.0	0.5	26.0	20.0
Nuclear	7.5	10.5	0.0	16.0	0.0
Hydroelectric	0.5	1.0	2.5	2.0	13.0
Other *	1.5	0.5	1.0	2.0	9.0
TOTAL	100	100	100	100	100

\* Other non-renewable and renewable sources (e.g., wood, wind, solar, geothermal)

Due to pollution problems associated with the use of coal and petroleum products, Dr. Novacek would like to see an increase in natural gas and renewable energy source use in the Republic. Within the next ten years, Dr. Novacek thinks energy use in the Republic could reach 40% for natural gas and “some” coal, and 27% for renewable sources. The other “missing” 33% would no longer be needed due to technological advances and the more efficient nature of renewable energy sources. He stated this missing 33% equates to energy “savings” and a boon to the Czech environment.<sup>79</sup>

While the use of renewable energy sources would be efficient and environmentally sound, it would be logistically and financially difficult to implement in most areas of the Republic. Due to topographical, geological, and climatological factors of the country, many difficulties arise. For example, wind would not be an easy energy source to harness simply based on the topography of the land throughout most of the Republic. Also, many rivers that run through the Republic have their headwaters in the country; therefore, the capability would not exist to generate enough hydrological power due to the slow flow rates of most Czech rivers.<sup>80</sup> It remains to be seen whether or not a major energy shift, as envisioned by Dr. Novacek, will occur.

---

Easily the most debated new energy source in the region is nuclear power. Several scholars and some Ministry officials believe nuclear reactors are far too risky, both in terms of their operation and waste disposal. According to these individuals, not nearly enough is known and confirmed about nuclear reactor operations and their potentially harmful effects—even though a nuclear power plant has been operating successfully in the Republic for ten years. This operational site is located in Dukovany of southern Moravia (see map on page XIV) and has a capacity of 1648 megawatts electric (MWe). (Dukovany consists of four reactors, each having a capacity of 412 MWe.) In southern Bohemia, there is another nuclear reactor site under construction—the Temelin Nuclear Power Plant. This plant consists of two reactors, with one expected to be operational in July 1999 and the other in August 2000. Temelin will have a capacity of 1824 MWe when fully operational.<sup>81</sup>

By comparison, Chernobyl in the Ukraine currently operates at 1650 MWe, but it is important to note the Chernobyl reactors are light-water-cooled, graphite-moderated (LGR). Both Dukovany and Temelin in the Czech Republic, by contrast, are pressurized light-water reactors (PWR),<sup>82</sup> which are deemed much safer than LGR reactors by most nuclear scientists. Despite this major technological difference, some researchers, Ministry officials, and a substantial segment of the civilian population still draw inappropriate comparisons between LGR reactors and PWR reactors.

Others believe nuclear energy is the way of the future, and most of the hysteria arising from the nuclear debate comes from nuclear accidents, particularly the 1986 Chernobyl incident. Many scientists believe much has been learned from the Chernobyl accident in terms of safe power plant operations. Throughout the 1980s and 1990s, the Czech Republic has received new technologies and support from the United Kingdom and the United States, and it has been successful at operating

its nuclear reactors safely while incorporating PWR technology. Specifically, researchers in the Republic have consistently been receiving reliable technical support from several United States organizations, including Westinghouse, the Los Alamos National Laboratory, and the Oak Ridge National Laboratory.<sup>83</sup>

Supporters of nuclear power also contend nuclear waste is not a significant problem, as several environmental groups have led the general public to believe. They firmly think the new technological advances are well-researched and reliable, and the risks of operating a nuclear reactor are minimal. Researchers at the Czech Technical University work in cooperation with the Czech government and, along with several other scientists, belong to the Nuclear Research Institute headquartered near Prague. They also work with researchers from Charles University and the Chemical Technical University in Prague.<sup>84</sup> Opposition to nuclear power is prevalent in the Republic, and it is the goal of nuclear researchers to demonstrate to the opposition the safety, reliability, and efficiency of nuclear power.

#### **Potential for Internal Conflict**

Discussions with senior government officials, reclamation company executives, and scientific scholars led me to believe the potential for internal conflict within the Republic based on environmental issues exists, but is not a cause for immediate concern. The environmentally friendly Green Party formally won seats in Slovakia's National Council and is also represented in Poland, but it does not presently possess much influence or political clout in the Czech Republic.<sup>85</sup>

Greenpeace members and other local activists have been consistently protesting new coal mining efforts, and even more so, nuclear reactor planning meetings and sites. These non-violent nuclear-related protests present obstacles the Czech government must overcome. As mentioned, the Czech government and scientific researchers are attempting to educate the general public on the safety and reliability of

---

nuclear power, but at the same time, Greenpeace members and local activists oppose this viewpoint and actively seek to sway public opinion. As a result, the general public is not convinced nuclear power is safe and efficient; however, there appears to be a gradual shift in this attitude to one of acceptance of the possibility that nuclear power may eventually become an alternative energy source in the Republic and Slovakia. In a 1991 survey of citizens in the Slovakian power plant area of Mochovce, only about one-third approved of the further development of nuclear power in Slovakia; two years later, over one-half approved.<sup>86</sup> Similar perceptions have also been documented in the Czech Republic.<sup>87</sup>

As the Czech Republic moves forward with initiatives to make nuclear power a primary energy source in the country, protests from local activists and Greenpeace will undoubtedly continue. The extent to which these protests will influence public opinion and adversely affect planning and construction efforts remains to be seen, but it is indeed an area of concern for government officials, nuclear researchers and planners, and contractors. Presently, the potential for internal conflict in the Republic based on environmental problems (and specifically with nuclear-related issues) appears to be relatively small. As the Republic approaches the completion of the Temelin Nuclear Power Plant, and perhaps plans for additional sites, the potential for internal conflict may increase.

#### **Potential for International Conflict**

The demise of the former Soviet Union and subsequent democratization of many eastern European countries have significantly changed the physical and political landscapes of that area of the world. The Czech Republic is surrounded by Austria, Germany, Poland, and Slovakia, and it presently has good diplomatic relationships with these countries.

The Republic's current relationships with these four countries have been strengthened through a series of negotiations and bilateral agreements concerning air and water pollution, waste management, and nature protection. Although there are major ideological differences with

Slovakia in particular, in terms of how to best approach the democratization and marketization of their countries, Czech-Slovak diplomatic ties are stable. Some activities concerning environmental issues have tested the Czech-Slovak relationship, such as Slovakia's decision to decline membership in Project Silesia, but the potential for any conflicts arising from these disagreements remains small. All government officials, reclamation company executives, and academicians interviewed are confident the potential for international conflict with Slovakia, or other neighboring countries, concerning environmental issues is minimal.

There are, however, three specific areas of international concern that came up in discussions with reclamation executives and scientific researchers: 1) nuclear power and Austria, 2) air and water pollution in the Black Triangle region, and 3) illegal waste dumping.

First, Austria has been outspoken in its views concerning nuclear power, and has protested the construction of the Temelin reactor site in the southern Bohemian region of the Republic. Vienna, the capital of Austria, is only 120 miles downwind from the reactor site; and Austria, being a non-nuclear state, fears a nuclear accident. The Chernobyl accident of 1986 is a major reason for its concern.<sup>88</sup>

Austrian public opinion is heavily influenced by the Austrian government, which is propagating negative information about nuclear power. The Austrian government and many Austrian scientists, for the most part, refuse to listen to evidence supporting nuclear power efficiency, safety, and reliability.<sup>89</sup> Additionally, Austria is able to efficiently and extensively harness great amounts of renewable energy sources, particularly hydroelectric power, whereas the Czech Republic is not.

Another issue of international significance is that of air and water pollution from the Czech Republic entering neighboring countries. Pollution from the Black Triangle region of the Republic, due to

---

prevailing winds and the direction of flow of rivers, is still crossing the northern border of the Republic and entering Poland and Germany. As mentioned, efforts are being made to reduce these emissions, but the flow of pollutants into these countries is still occurring. Discussions with Ministry of the Environment officials, reclamation company executives, and academicians indicate good international relationships exist in central and eastern Europe based on environmental issues. These relationships should remain stable as long as environmental problems continue to be addressed in a thoughtful, analytical manner. If efforts to reduce emissions and clean up rivers wane (or are perceived to wane) in the Republic, the potential for international conflict would increase.

Many southern Polish forests, as well, have been destroyed (and continue to die) as a result of transboundary air pollution coming from Germany and, more significantly, the Czech Republic.<sup>90</sup> Poland recognizes the Republic's commitment to improving the environment and reducing industrial and power plant emissions, yet tensions can run high when these issues are discussed in international conferences.<sup>91</sup> Several bilateral agreements exist and participating countries appear to adhere to their statutes, but the potential for disagreements and confrontations still exists, particularly at diplomatic and political levels. Presently, the potential for international conflict in this area appears minimal.

Lastly, although it is now illegal for Germany and Poland to dump hazardous (and other) wastes in the Czech Republic, government officials contend it is occurring to some extent. It is logistically and financially difficult to enforce the new environmental laws passed in the Republic over the last several years, especially in the area of waste management; however, the country is attempting to bolster its efforts in this area. Illegal dumping is probably not a major diplomatic problem, and international relations do not appear to be strained as a result of this issue.<sup>92</sup>

## **Conclusions and Recommendations**

Since the democratization and marketization of the Czech Republic, the country has seen some major changes in its economic outlook and has made a priority of reconciling its political and economic development with environmental protection. Significant environmental advancements have been attained, largely as a result of increased public knowledge and the adoption of newly created environmental policies (both internal and international). The Republic is serious about its battle against air and water pollution, groundwater and surface water contamination, poor waste management practices, and the needless destruction of nature.

The Republic has incorporated several new industrial technologies and has received outside assistance from other European countries and the United States in the form of informational, technological, and financial support. This has been especially beneficial in the Republic's clean-up efforts and in their quest for new economical, efficient, and environmentally safe alternative energy sources for the country. Privatization in the Republic has also aided in these efforts internally. Private reclamation companies, such as KAP and RVM, are providing a much needed, and effective, service to the country as they work toward solving environmental problems. According to Ministry of the Environment officials, these companies are essential to solving these problems and supporting environmental risk assessment and monitoring efforts.

The Republic has signed into law several environmental policy acts and regulations since 1990, including the Clean Air Act of 1991 (revised air pollution legislation is currently in draft), the amended Water Management Act of 1992, the Czech National Council Act on the Protection of Nature and the Landscape of 1992, the Waste Management Act of 1992, and the 1997 Waste Control Act. These internally driven

---

pieces of legislation have met with some resistance from industries, power plants, and the general public to some extent, but overall, they have been understood as necessary and have been supported.

The Ministry of the Environment, private reclamation companies, and some international organizations and projects, such as Project Silesia, aim to regulate these newly passed pieces of legislation and are heavily involved in environmental risk assessment and monitoring. These efforts are quite ominous, but with emphasis being placed on them by the government, and with support of neighboring countries, the outlook is positive. Having said that, however, it should be emphasized that there is a distinction between a law “on the books” and one that is actually enforced. In part due to the Republic’s recent economic instability, it remains to be seen whether or not its several environmental laws can be successfully enforced.

One of the more significant environmental issues is ensuring the Republic continues its search for economical, efficient, and environmentally safe alternative energy sources. Presently, coal is the primary energy source in the country; however, even with new technological advancements to improve the health and environmental impacts of coal burning, there are more sophisticated and efficient energy sources. A shift to natural gas and nuclear power would decrease the amount of air and water pollutants and provide more efficient means of energy production. Shifting the structure of primary energy sources to qualitatively better fuels, along with the introduction of less energy-consuming technologies and the activation of new nuclear reactors, would eventually replace most of the output of coal burning power plants.<sup>93</sup>

In part due to the recent democratization of the new Republic, political and environmental activist groups have gathered momentum. Protesters have become increasingly more vocal in speaking out against several industrial projects they deem environmentally unsound.



Particularly, Greenpeace and local activist groups have protested the construction of the Temelin Nuclear Power Plant, and they continue to do so. Internal confrontations have increased, with environmental groups providing negative propaganda about industrial activities and nuclear power to the Czech general public. The potential for internal conflict may increase with advancements made in nuclear technologies; and although not a major problem at this time, should be considered an increasingly possible threat in the coming months and years.

Bilateral agreements concerning environmental issues have, in my opinion, reduced the threat of international conflict, particularly with Poland, Germany, and Slovakia. Although some issues concerning Black Triangle pollution remain in the limelight, international relations do not seem to be heavily strained. Continued efforts to further reduce emissions and strengthen diplomatic ties will help maintain strong, positive relationships.

The issue of Austria and its adamant protests of the Republic's nuclear power plant construction and operation is of greater concern. Since Austria is a non-nuclear state and propagates negative information about nuclear power to its citizens and other countries, one can see the reason for heightened concern. To this point, there have been no political or military threats, or major confrontations, but concerns are rising among some Ministry of the Environment officials and scientific researchers as the operational date of the new Temelin reactor site approaches.

In general, the Republic's infrastructure appears to be intact and is successfully supporting the environmental issues facing the country today. Immediately following the Republic's "new beginning" in 1993, its economy grew consistently and rapidly. Recently, however, the country's economy began to struggle, and as such, time will tell whether or not the Republic will be able to successfully enforce its new environmental legislation. Regardless of the country's economic status,

continued foreign support and investment will undoubtedly be necessary for the Republic to reach the level of environmental security and safety of other westernized countries.

The Republic's environmental developments and efforts to pass new environmental legislation were impressive. The successful enforcement of this legislation, however, remains to be seen. The supportive relationships between neighboring countries, government agencies, private reclamation companies, and industries were also impressive; but although concern involving internal or international conflict is not great at this time, certain issues, particularly transboundary pollution problems and the nuclear power debate, warrant continued monitoring.

## ENDNOTES

- <sup>1</sup> Michael G. Roskin, *The Rebirth of East Europe*, 2nd Edition (Englewood, NJ: Prentice Hall, 1994), 74.
- <sup>2</sup> Ibid, 75.
- <sup>3</sup> Jiri Pokorny, *The Czech Lands: 1918-1994* (Prague, Czech Republic: Prah-Martin Vopenka, 1994), 34.
- <sup>4</sup> "Eastern Europe: Approaching the West," *Swiss Review of World Affairs*, government document, January 1995.
- <sup>5</sup> Pokorny, *The Czech Lands: 1918-1994*, 34.
- <sup>6</sup> Ministry of the Environment interview, 12 June 1997.
- <sup>7</sup> Carol S. Leff, "The Czech and Slovak Republics: Nation Versus State," *Nations of the Modern World: Europe Series* (Boulder, CO: Westview Press, 1997), 56-57.
- <sup>8</sup> Pokorny, *The Czech Lands: 1918-1994*, 35.
- <sup>9</sup> Ibid, 36-37.
- <sup>10</sup> Ibid, 37.
- <sup>11</sup> Ibid, 38-39.
- <sup>12</sup> Leff, "The Czech and Slovak Republics: Nation Versus State," 58, 64.
- <sup>13</sup> Ibid, 79-80.
- <sup>14</sup> Pokorny, *The Czech Lands: 1918-1994*, 39-40.
- <sup>15</sup> Pavel Novacek and Peter Mederly, *Strategy of Sustainable Development for the Czech Republic: Case Study of the Country in Transition* (Olomouc, Czech Republic: Palacky University Press, 1996), 1.
- <sup>16</sup> Palacky University interview, 16 June 1997.
- <sup>17</sup> Leff, "The Czech and Slovak Republics: Nation Versus State," 126-129.
- <sup>18</sup> United States Air Force Academy interview, 23 October 1997.

<sup>19</sup> K. McKinsey, "The Velvet Divorce Set Good Example," *The Montreal Gazette*, 17 October 1995.

<sup>20</sup> "Czech Republic Country Update," The Economic Intelligence Unit, *EIU ViewsWire*, 05 November 1997.

<sup>21</sup> Jane Perlez, "For the Czechs, The Fairy Tale Is All Over Now," *The New York Times*, 01 December 1997, A1.

<sup>22</sup> "Czech Republic Country Update," The Economic Intelligence Unit, *EIU ViewsWire*, 10 July 1998.

<sup>23</sup> Vladislav Bizek et. al., *Report on the Environment in the Czech Republic in 1995* (Prague, Czech Republic: Ministry of the Environment, December 1996), 6.

<sup>24</sup> Ministry of the Environment interview, 12 June 1997.

<sup>25</sup> Bizek, *Report on the Environment in the Czech Republic in 1995*, 8.

<sup>26</sup> Ministry of the Environment interview, 12 June 1997.

<sup>27</sup> Ministry of the Environment interview, 12 June 1997.

<sup>28</sup> Palacky University interview, 16 June 1997.

<sup>29</sup> Ministry of the Environment interview, 12 June 1997.

<sup>30</sup> Ministry of the Environment interview, 17 June 1997.

<sup>31</sup> Ministry of the Environment interview, 12 June 1997.

<sup>32</sup> Ministry of the Environment and Palacky University interviews, 12 and 16 June 1997.

<sup>33</sup> Ministry of the Environment and RVM Joint Stock Company interviews, 12 and 13 June 1997.

<sup>34</sup> Samuel T. Ariaratnam and Laura M. Antalík. *Environmental Security and Infrastructure in Poland: Impacts from the Demise of the Former Soviet Union*. Unpublished manuscript, United States Air Force Academy, October 1996.

<sup>35</sup> Ministry of the Environment interviews, 12 and 18 June 1997.

## ENDNOTES

- <sup>1</sup> Michael G. Roskin, *The Rebirth of East Europe*, 2nd Edition (Englewood, NJ: Prentice Hall, 1994), 74.
- <sup>2</sup> Ibid, 75.
- <sup>3</sup> Jiri Pokorny, *The Czech Lands: 1918-1994* (Prague, Czech Republic: Prah-Martin Vopenka, 1994), 34.
- <sup>4</sup> "Eastern Europe: Approaching the West," *Swiss Review of World Affairs*, government document, January 1995.
- <sup>5</sup> Pokorny, *The Czech Lands: 1918-1994*, 34.
- <sup>6</sup> Ministry of the Environment interview, 12 June 1997.
- <sup>7</sup> Carol S. Leff, "The Czech and Slovak Republics: Nation Versus State," *Nations of the Modern World: Europe Series* (Boulder, CO: Westview Press, 1997), 56-57.
- <sup>8</sup> Pokorny, *The Czech Lands: 1918-1994*, 35.
- <sup>9</sup> Ibid, 36-37.
- <sup>10</sup> Ibid, 37.
- <sup>11</sup> Ibid, 38-39.
- <sup>12</sup> Leff, "The Czech and Slovak Republics: Nation Versus State," 58, 64.
- <sup>13</sup> Ibid, 79-80.
- <sup>14</sup> Pokorny, *The Czech Lands: 1918-1994*, 39-40.
- <sup>15</sup> Pavel Novacek and Peter Mederly, *Strategy of Sustainable Development for the Czech Republic: Case Study of the Country in Transition* (Olomouc, Czech Republic: Palacky University Press, 1996), 1.
- <sup>16</sup> Palacky University interview, 16 June 1997.
- <sup>17</sup> Leff, "The Czech and Slovak Republics: Nation Versus State," 126-129.
- <sup>18</sup> United States Air Force Academy interview, 23 October 1997.

<sup>19</sup> K. McKinsey, "The Velvet Divorce Set Good Example," *The Montreal Gazette*, 17 October 1995.

<sup>20</sup> "Czech Republic Country Update," The Economic Intelligence Unit, *EIU ViewsWire*, 05 November 1997.

<sup>21</sup> Jane Perlez, "For the Czechs, The Fairy Tale Is All Over Now," *The New York Times*, 01 December 1997, A1.

<sup>22</sup> "Czech Republic Country Update," The Economic Intelligence Unit, *EIU ViewsWire*, 10 July 1998.

<sup>23</sup> Vladislav Bizek et. al., *Report on the Environment in the Czech Republic in 1995* (Prague, Czech Republic: Ministry of the Environment, December 1996), 6.

<sup>24</sup> Ministry of the Environment interview, 12 June 1997.

<sup>25</sup> Bizek, *Report on the Environment in the Czech Republic in 1995*, 8.

<sup>26</sup> Ministry of the Environment interview, 12 June 1997.

<sup>27</sup> Ministry of the Environment interview, 12 June 1997.

<sup>28</sup> Palacky University interview, 16 June 1997.

<sup>29</sup> Ministry of the Environment interview, 12 June 1997.

<sup>30</sup> Ministry of the Environment interview, 17 June 1997.

<sup>31</sup> Ministry of the Environment interview, 12 June 1997.

<sup>32</sup> Ministry of the Environment and Palacky University interviews, 12 and 16 June 1997.

<sup>33</sup> Ministry of the Environment and RVM Joint Stock Company interviews, 12 and 13 June 1997.

<sup>34</sup> Samuel T. Ariaratnam and Laura M. Antalík. *Environmental Security and Infrastructure in Poland: Impacts from the Demise of the Former Soviet Union*. Unpublished manuscript, United States Air Force Academy, October 1996.

<sup>35</sup> Ministry of the Environment interviews, 12 and 18 June 1997.

<sup>77</sup> Ministry of the Environment and RVM Joint Stock Company interviews, 12 and 13 June 1997.

<sup>78</sup> *Energy Overview Series*, Fossil Fuel International. (OECD and DOE data, [www.fe.doe.gov](http://www.fe.doe.gov) web site, September 1998).

<sup>79</sup> Palacky University interview, 16 June 1997.

<sup>80</sup> Ministry of the Environment interview, 17 June 1997.

<sup>81</sup> "World List of Nuclear Power Plants," *Nuclear News* 41 (March 1998): 41.

<sup>82</sup> Ibid.

<sup>83</sup> Czech Technical University interview, 18 June 1997.

<sup>84</sup> Ibid.

<sup>85</sup> Leff, "The Czech and Slovak Republics: Nation Versus State," 205-206.

<sup>86</sup> Ibid, 204.

<sup>87</sup> Ministry of the Environment and KAP Corporation interviews, 12 June 1997.

<sup>88</sup> Leff, "The Czech and Slovak Republics: Nation Versus State," 203-204.

<sup>89</sup> Czech Technical University interview, 18 June 1997.

<sup>90</sup> Ministry of the Environment interview, 12 June 1997.

<sup>91</sup> Ministry of the Environment interviews, 12 and 17 June 1997.

<sup>92</sup> Ministry of the Environment interview, 17 June 1997.

<sup>93</sup> Bizek, *Report on the Environment in the Czech Republic in 1995*, 14.

## **SOURCES CONSULTED**

### ***Interviews***

Brix, Bohuslav, Director, Air Protection Department, Ministry of the Environment of the Czech Republic. 12 June 1997. Prague, Czech Republic.

Cizkova, Helena, Deputy Director, International Relations Department, Ministry of the Environment of the Czech Republic; Director, Project Silesia. 17 June 1997. Ostrava, Czech Republic.

Kinkor, Jaroslav, Director, Water Protection and Management Department, Ministry of the Environment of the Czech Republic. 18 June 1997. Prague, Czech Republic.

Malasek, Eduard, Assistant to the Director, Environmental Risks and Monitoring Department, Ministry of the Environment of the Czech Republic. 12 June 1997. Prague, Czech Republic.

Mikulova, Vlastimila, Director, Waste Management Department, Ministry of the Environment of the Czech Republic. 18 June 1997. Prague, Czech Republic.

Novacek, Pavel, Professor of Ecology, Department of Ecology, Palacky University. 16 June 1997. Olomouc, Czech Republic.

Roth, Petr, Director, Nature Protection Department, Ministry of the Environment of the Czech Republic. 12 June 1997. Prague, Czech Republic.

Sebesta, Ferdinand, Research Scientist, Department of Nuclear Chemistry, Nuclear Sciences and Physical Engineering Division, Czech Technical University. 18 June 1997. Prague, Czech Republic.

Sixta, Jan, Manager, RVM (Restoration, Management, and Technology) Joint Stock Company. 13 June 1997. Most, Czech Republic.

Ulrich, Marybeth, Associate Professor of Political Science, Department of Political Science, United States Air Force Academy. 9 September 1997, 23 October 1997, 11 February 1998. United States Air Force Academy, Colorado.

Wichterle, Martin, Director, Environmental Department, KAP (Consultation, Remediation, and Investigation) Corporation. 12 June 1997. Prague, Czech Republic.



### *Printed Sources*

Ariaratnam, Samuel T. and Laura M. Antalík. 1996. *Environmental Security and Infrastructure in Poland: Impacts from the Demise of the Former Soviet Union*. Unpublished manuscript, United States Air Force Academy.

Bizek, V., et. al. 1996. *Report on the Environment in the Czech Republic in 1995*. Ministry of the Environment of the Czech Republic, Prague, Czech Republic.

Cizkova, H., et. al. 1996. *Project Silesia*. Information Centre of the Project Silesia, Ostrava, Czech Republic.

*Czech National Council Act on the Protection of Nature and the Landscape*. 1992. Czech Institute for Nature Conservation, Prague, Czech Republic.

*EIU ViewsWire*, The Economic Intelligence Unit. "Czech Republic Country Update," 05 November 1997 and 10 July 1998.

Fossil Fuel International, *Energy Overview Series*. 1998. Organization for Economic Cooperation and Development (OECD) and U.S. Department of Energy. World-wide Web site: [www.fe.doe.gov](http://www.fe.doe.gov).

*KAP Company Profile*. 1996. KAP (Consultation, Remediation, and Investigation) Corporation, Prague, Czech Republic.

Leff, C.S. 1997. *The Czech and Slovak Republics: Nation versus State*. Nations of the Modern World: Europe Series. Westview Press, Boulder, Colorado.

McKinsey, K. "The Velvet Divorce Set Good Example." *The Montreal Gazette*, 17 October 1995.

Novacek, P., Mederly, P., et. al. 1996. *Strategy of Sustainable Development for the Czech Republic: Case Study of the Country in Transition*. Palacky University, Olomouc, Czech Republic; Society for Sustainable Living Prague, Bratislava; Millennium Institute, Arlington, Virginia.

*Nuclear News*. March 1998. "World List of Nuclear Power Plants." American Nuclear Society, Volume 41, Number 3.

---

Perlez, J. "For The Czechs, The Fairy Tale Is All Over Now." *The New York Times*, 01 December 1997, p. A1.

Pokorny, J. 1994. *The Czech Lands: 1918-1994*. Prah-Martin Vopenka, Prague, Czech Republic.

Roskin, M.G. 1994. *The Rebirth of East Europe*, 2nd Edition. Prentice Hall Publishing, Englewood, New Jersey.

Swiss Review of World Affairs. January 1995. *Eastern Europe: Approaching the West*.

## RECENT INSS OCCASIONAL PAPERS

3. *North Korea's Nuclear Program: The Clinton Administration's Response.* William E. Berry, Jr., March 1995
4. *Environmental Assistance as National Security Policy: Helping the Former Soviet Union Find Solutions to its Environmental Problems.* Robert L. Dunaway, November 1995
5. *Economic Power in the Sino-U.S. Relationship.* Kevin F. Donovan, December 1995
6. *Nuclear Proliferation: Diminishing Threat?* William H. Kincade, December 1995
7. *Nuclear Proliferation: The Diplomatic Role of Non-Weaponized Programs.* Rosalind R. Reynolds, January 1996
8. *Five Minutes Past Midnight: The Clear and Present Danger of Nuclear Weapons Grade Fissile Materials.* Guy B. Roberts, February 1996
9. *The International Legal Implications of Information Warfare.* Richard W. Aldrich, April 1996
10. *Weapons Proliferation and Organized Crime: The Russian Military and Security Force Dimension.* Graham H. Turbiville, Jr., June 1996
11. *Melancholy Reunion: A Report from the Future on the Collapse of Civil-Military Relations in the United States.* Charles J. Dunlap, Jr., October 1996
12. *Russia's Crumbling Tactical Nuclear Weapons Complex: An Opportunity for Arms Control.* Stephen P. Lambert and David A. Miller, April 1997
13. *Political-Military Affairs Officers and the Air Force: Continued Turbulence in a Vital Career Specialty.* James E. Kinzer and Marybeth Peterson Ulrich, April 1997
14. *Environmental Federalism and U.S. Military Installations: A Framework for Compliance.* James M. Smith, June 1997.
15. *Nonlethal Weapons: Terms and References.* Robert J. Bunker, July 1997.
16. *Threat Perceptions in the Philippines, Malaysia, and Singapore.* William E. Berry, Jr., September 1997.
17. *NATO Counterproliferation Policy: A Case Study In Alliance Politics.* Jeffrey A. Larsen, November 1997.
18. *Uncharted Paths, Uncertain Vision: U.S. Military Involvements in Sub-Saharan Africa in the Wake of the Cold War.* Dan Henk, March 1998.
19. *USAF Culture and Cohesion: Building an Air and Space Force for the 21<sup>st</sup> Century.* James M. Smith, June 1998.
20. *A Post-Cold War Nuclear Strategy Model.* Gwedolyn Hall, John T. Cappello, and Stephen P. Lambert, July 1998.
21. *Counterforce: Locating and Destroying Weapons of Mass Destruction* Robert W. Chandler, September 1998

---

**UNITED STATES AIR FORCE ACADEMY**

**Lieutenant General Tad J. Oelstrom**  
**Superintendent**

**Brigadier General David A. Wagie**  
**Dean of the Faculty**

**HEADQUARTERS, US AIR FORCE**  
**NUCLEAR AND COUNTERPROLIFERATION DIRECTORATE**

**Brigadier General Timothy J. McMahon**  
**Director**

**Colonel Thomas D. Miller**  
**Chief, Policy Division**

**USAF INSTITUTE FOR NATIONAL SECURITY STUDIES**

**Dr James M. Smith**  
**Director**

**Major Vincent J. Jodoin**  
**Deputy Director**

**Ms Marsha Taylor**  
**Cover Design**

---

**USAF Institute for National Security Studies**

HQ USAFA/DFES  
2354 Fairchild Drive, Suite 5L27  
USAF Academy CO 80840

<http://www.usafa.af.mil/inss>

(719) 333-2717  
DSN: 333-2717  
FAX: 333-2716